

CORALLORHIZA MACULATA VAR. *OZETTENSIS* (ORCHIDACEAE), A NEW
CORAL-ROOT FROM COASTAL WASHINGTON

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ABSTRACT

Corallorhiza maculata var. *ozettensis* is a newly described mycoheterotrophic orchid from western Washington. It occurs in foggy rainforests bordering the Pacific coast of the north Olympic Peninsula. Unlike typical *C. maculata*, its flowers are consistently non-spotted, with a narrow, white labellum bearing two apical undulations and low, non-rugose basal lamellae. Stem cross sections show epidermal cells mostly tangentially elongate, each bearing 4–10 delicate cuticular ridges bounded laterally by narrow sinuses.

In June 1967, I collected a unique, white-lipped *Corallorhiza* near the Ozette Indian Reservation of coastal Washington. Subsequent collections and observations revealed that populations of this coral-root, referred eventually to *C. maculata* (Raf.) Raf. (Buckingham and Tisch 1979), extended northward and inland at least 27 km and 1.5 km, respectively. The type collections are remarkably uniform in color, morphology, cell anatomy, and ecological fidelity, and in this locality occur to the apparent exclusion of contrasting varieties of *C. maculata*. While these plants exhibit homogeneity suggestive of reproductive isolation and are not distributed randomly within populations of spotted *C. maculata*, as are many of its recognized color forms, their structural parameters lie within the limits established for *C. maculata* (Luer 1975, Freudenstein 1997), and I have relegated them to varietal status under that species.

Corallorhiza maculata* (Raf.) Raf. var. *ozettensis

E. Tisch, var. nov. (Fig. 1 in part)—TYPE: USA, Washington, Clallam Co., forested bluffs above Cape Alava, 48°10'N 124°44'W, T31N R16W sect. 26, ca. 100' (30 m) elev., 28 June 1967, *E.L. Tisch 689A & 689B* (holotype, UC; isotype, OSC).

Caulis erectus, 20–60 cm altus, pallidus, roseus-violescens vel brunneo-violescens. Inflorescentia 3–20-flora, 5–17 cm longa, 2–3 cm lata. Pedicelli 1–2 mm longi, erecti vel penduli, bracteati. Bractae ovatae vel lanceolatae, 0.5–1.5(1.8) mm longae, acutae, obtusae, truncatae vel emarginatae. Flores 1.0–1.5 cm longi, 6–12 mm lati; sepala superior oblongo-oblancoolata, obtusa vel emarginata, (6.2)7.0–9.5(9.8) mm longa, (2.0)2.2–2.3(2.5) mm lata, apex purpureus, basis flavus; sepala laterala oblongo-oblancoolata, obtusa vel acuta, (5.8)6.5–9.0(9.4) mm longa, (1.8)2.2–2.3(2.5) mm lata, apex purpureus, basis flavus; petala oblongo-lanceolata, obtusa vel acuta, (5.5)6.0–7.0(7.3) mm longa, (1.7)1.9–2.1(2.3) mm lata, flava; labellum oblancoolatum vel obovatum, trilobatum, trinerviatum,

album immaculatum, obtusum, (5.0)5.5–7.5(8.0) mm longum, (2.6)3.1–3.5(3.6) mm latum, apex bi-undulatum; mentum 1.0–2.0 mm longum, 0.4–1.0 mm altum; columna arcuata, 3.5–4.8 mm longa; stigma ca. 0.9–1.3 mm lata. Fructus elliptico-oblongus, purpureus vel brunneus, pendulus, pauciverrucosus, 1.0–1.5 cm longus, 3–4 mm crassus.

Stems erect, 20–60 cm tall, pale pinkish violet or brownish violet. Racemes 3–20-flowered, 5–17 cm long, 2–3 cm wide. Pedicels 1–2 mm long, erect at anthesis to pendent in fruit. Floral bracts ovate to lanceolate, 0.5–1.5(1.8) mm long, acute, obtuse, truncate, emarginate, or bluntly tridentate. Flowers ascending at anthesis, 1.0–1.5 cm in length, 6–12 mm wide; dorsal sepal forward facing, oblong-oblancoolata, obtuse to obliquely emarginate, (6.2)7.0–9.5(9.8) mm long, (2.0)2.2–2.3(2.5) mm wide, the apex purplish, often with translucent margins, basal portions yellowish; lateral sepals usually spreading, oblong-oblancoolata, obtuse to nearly acute, (5.8)6.5–9.0(9.4) mm long, (1.8)2.2–2.3(2.5) mm wide, the apex purplish, basal portions yellowish; petals forward facing, oblong-oblancoolata, obtuse to acute, (5.5)6.0–7.0(7.3) mm long, (1.7)1.9–2.1(2.3) mm wide, yellowish; labellum oblancoolata or obovate, 3-lobed, nearly always 3-nerved, pure white at early anthesis (darkening with age), obtuse, (5.0)5.5–7.5(8.0) mm long, (2.6)3.1–3.5(3.6) mm wide at the widest part of the median lobe, the apex slightly dilated but rarely crenate-undulate or involute, usually bi-undulate at the tip (Fig. 1), the basal lamellae 1.7–2.2 mm long, arising within 2 mm of the labial attachment and extending to within 2.2–2.5 mm of its apex, non-rugose; mentum yellowish, 1.0–2.0 mm long, 0.4–1.0 mm high, yellow; column yellowish, often arcuate-ascending, 3.5–4.8 mm long; stigma ca. 0.9–1.3 mm wide. Capsule ellipsoidal, purplish to brown, slightly warty, 1.0–1.5 cm long, 3–4 mm thick.

Paratypes. USA, Washington, Clallam Co.: coastal forests at Cape Flattery, 48°23'N 124°44'W, T33N R16W sect. 1, ca. 75' (23 m) elev., 23 July 1984, *E.L. Tisch 2653* (WTU), *2654* (ORE), *2655*

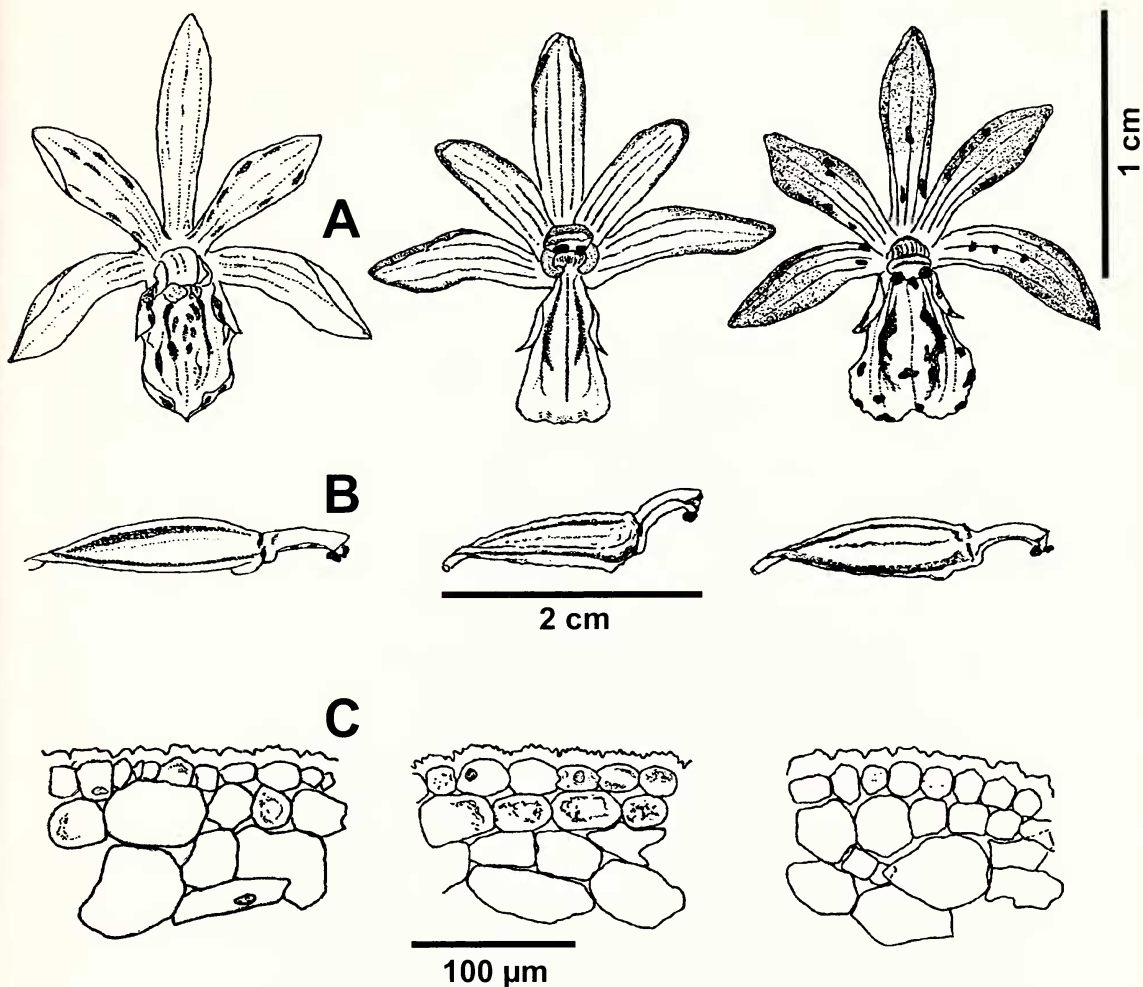
*maculata**ozettensis**occidentalis*

FIG. 1. Illustrations comparing three varieties of *C. maculata*. A. Anterior views taken of living flowers with perianths folded back. B. Lateral views of immature capsules (perianths removed) showing frequent column orientations. C. Portions of stem cross sections taken 1 cm below the inflorescence. Illustrations by Karen Lull-Butler.

(WS); shady coastal forest, ca. 90 m inland, Cape Flattery, ca. 100' (30 m) elev., 27 July 1984, *E.L. Tisch* 2688 (UC), 2689 (OSC); forested bluffs, Portage Head, 48°17'N 124°41'W, T32N R15W sect. 7, ca. 80' (25 m) elev., 18 June 1988, *E.L. Tisch* 3256 (MO), 3257 (V).

Distribution, habitat, and phenology. *Corallorhiza maculata* var. *ozettensis* grows in moist, foggy, very shady to moderately illuminated forests bordering the northwestern coastline of the Olympic Peninsula. The collection sites, all within 300 m of the Pacific Ocean, are overstoried by mixtures of *Picea sitchensis* (Bong.) Carr., *Thuja plicata* D. Don, *Tsuga heterophylla* (Raf.) Sarg., and *Alnus rubra* Bong. A sparse understory of *Malus fusca* (Raf.) Schneid. and *Rhamnus purshiana* DC. is of-

ten present, while the medium-shrub layer includes *Vaccinium alaskense* Howell, *V. ovatum* Pursh, *V. parvifolium* Smith, and *Menziesia ferruginea* Smith.

The common herb associates are *Blechnum spicant* (L.) Smith, *Polystichum munitum* (Kaulf.) Presl, *Maianthemum dilatatum* (Alph. Wood) Nelson and J. F. Macbr., *Tiarella trifoliata* L., *Listera caurina* Piper, and *L. cordata* (L.) R. Br. In its typical habitats *C. maculata* var. *ozettensis* is inconspicuous and rare. It is mycoheterotrophic and has knobby rhizomes embedded 1–2 dm in moist humus. Depending on weather conditions, it blooms from about mid-June through late July. This is considered "late" flowering for *Corallorhiza* as described by Freudenstein and Doyle (1994) and Freudenstein (1997).

Taxonomic relationships. Luer (1975) called *C. maculata* the most common and variable coral-root in the conterminous United States, and suggested that its color forms, while sometimes clustering in communities, tend to lack morphological identity separate from that of associated spotted individuals. He did not clearly differentiate between forms and varieties. Kartez (1994) synonymized all of the *C. maculata* variants under that single specific epithet. After years of research, Freudenstein (1986, 1992, 1997) narrowed the *C. maculata* complex, north of Mexico, to two intergradient varieties: *maculata* and *occidentalis* (Lindl.) Ames. Brown (1998), however, in his orchid checklist, recognized 8 infraspecific segregates, including forms, within that same complex. The var. *maculata*, a narrow-lipped, late-blooming variant, appears to be uncommon on the Olympic Peninsula, and is often intergradient here with the broad-lipped, early-blooming var. *occidentalis*, which is larger and quite conspicuous, flowering as early as May 5 in the Olympic lowlands. Variety *ozettensis* has a narrow, white labellum bearing two closely adjacent, upward undulations, one to either side of the mid-apex, and low, non-rugose basal lamellae. The labellum tapers to its attachment which is usually less than 1 mm wide. Its lateral and apical margins are semi-entire, contrasting with the crenate-undulate margins of the other two varieties. The narrow cuticular ridges on the stem epidermis number 4–10 per cell, nearly twice as many as the low, rounded ridges bordering comparable cells of vars. *maculata* and *occidentalis* (Fig. 1C). Also, the cauline epidermal cells of var. *ozettensis*, seen in cross sections taken 1 cm below the inflorescence, are >65% tangentially elongate, while those from the two spotted varieties of this region have <50% positioned in that plane. These diagnostic microscopic features were encountered consistently in living stems from 10 specimens of var. *ozettensis*, 15 of var. *occidentalis*, and 7 of var. *maculata*. The latter two varieties, at least on the Olympic Peninsula, have columns that often align with the floral axis, while those of var. *ozettensis* tend to ascend at angles >25° (Fig. 1B), but these tendencies are not entirely reliable.

Superficially, var. *ozettensis* appears to be closely allied with forma *immaculata* (Peck) Howell, a white-lipped variant described from Linn Co., Oregon (Peck 1954), and currently referred to var. *occidentalis* in Brown's (1998) checklist. Actually, this form of *C. maculata* is readily separable from var. *ozettensis*. The *immaculata* holotype (OSC!) has spreading perianth parts, and a crenulate, distally expanded labellum with multiple levels of venation. The latter half of the following key is modeled after Freudenstein's (1997) key to the varieties of *C. maculata*.

KEY TO THREE VARIETIES OF *CORALLORHIZA MACULATA* AS REPRESENTED IN COASTAL WASHINGTON

1. Labellum white at early anthesis (darkening with age), its lateral nerves usually simple; the margins of its central lobe sub-entire *C. maculata* var. *ozettensis*
1. Labellum usually white, spotted with purple, its lateral nerves often prominently branched; the central lobe distally crenate-undulate 2
2. Central lobe of labellum distinctly expanded, its broadest distal portion > 1.5 times wider than its base; labial apex broadly rounded to retuse *C. maculata* var. *occidentalis*
2. Central lobe of labellum slightly if at all expanded, its broadest distal portion < 1.5 times wider than its base; labial apex narrowly rounded to acute *C. maculata* var. *maculata*

The Ozette coral-root is named after the Ozette band of Makah Indians that occupied the original collection site for hundreds of years.

ACKNOWLEDGMENTS

I wish to thank Karen Lull-Butler for the drawings, Vince Murray for reviewing my Latin, and Kristina A. Schierenbeck for her expeditious editing of this manuscript. Kenton L. Chambers and Paul M. Brown gave many useful suggestions for which I am grateful.

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